## Unit III

**5.** (a) Define the following :

Sensible heat, latent heat and superheated steam required for water to be converted into steam. **5**

(b) Explain dryness fraction and wetness fraction of the steam and derive an expression for throttling and measruement of dryness fraction of the steam by using separating and throttling calorimeter with neat sketch. **10**

**6.** (a) Explain the concept of properties of ideal gas mixture and how the entropy changes on mixing. **9**

(b) Explain Gibb's phase rule and referigerants used in the referigeration and air-conditioning. **6**

## Unit IV

**7.** (a) Explain Clausius-Clapeyron equation and Maxwell thermodynamic relations. **10**



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## B. Tech. EXAMINATION, Dec. 2018

(Third Semester)

(B. Scheme) (Main & Re-appear)

(ME, AER)

ME201B

THERMODYNAMICS

*Time :* 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

**Note** : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Scientific calculators and steam table are allowed.

## Unit I

**1.** (a) Difference between work and heat by giving suitable examples. **6**

(b) Define the following :

(i) Thermodynamic cycle and Mechanical cycle

(ii) Concept of Compressible and Incompressible substances

(iii) Thermodynamic state, process and cycle. **9**

**2.** (a) Explain with neat sketch zeroth law of thermodynamics. **7**

(b) Explain steady and transient processes. **3**

(c) Explain free expansion process for an open system. **5**

## Unit II

**3.** (a) Explain with neat sketch 2nd law of thermodynamics and discuss how it introduces the concept of entropy. **9**



(b) A reversible heat engine interacts with three thermal reservoirs at 750K, 650K, 550K. The engine absorb 2400 kJ/min of energy as heat from the reservoir at 750 K and does 400 kJ/min of network. Determine the magnitude and direction of heat interactions of the engine with the other two reservoirs. **6**

**4.** (a) Explain third law of thermodynamics and explain with neat sketch how it introduces the concept of 0ºK (zero degree Kelvin). **10**

(b) A reversible engine receives heat from a source at 700ºC and rejects heat to the sink at temperature $T_2$. The second reversible engine receives heat rejected by the first engine and rejects to a sink at 37ºC. Find the value of $T_2$ if :

(i) Efficiency of both engines is same

(ii) Work output of both engines is same. **5**

(b) Explain Joule's Thompson coefficient and inversion curve. **5**

**8.** (a) Explain equilibrium constant for ideal gas mixture and its variation with temperature. **6**

(b) For an ideal gas the specific values of heat at constant pressure and volume are 0.984 kJ/kgK and 0.728 kJ/kg-K. Determine the characteristic gas constant and ratio of specific heat.

One kg. of this gas is heated at constant pressure from 25ºC to 200ºC. Make calculations for heat added, workdone, change in internal energy, pressure and final volume. Initial volume = $2m^3$. **9**



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